

WHAT IS CLAIMED IS:

1 1. A method of revascularizing a portion of a
 2 patient's myocardium comprising:
 3 positioning an active electrode surface in close
 4 proximity to a target site on a wall of the patient's heart;
 5 and
 6 applying high frequency voltage between the active
 7 electrode surface and a return electrode to ablate tissue at
 8 the heart wall and to form a revascularizing channel through
 9 at least a portion of the heart wall.

1 2. The method of claim 1 further comprising
 2 axially translating the active electrode surface through a
 3 portion of the heart wall to form the revascularizing channel.

1 3. The method of claim 1 further comprising:
 2 introducing at least a distal end of an
 3 electrosurgical catheter into the ventricle of the heart; and
 4 positioning the distal end of the catheter in close
 5 proximity to the endocardium.

1 4. The method of claim 1 further comprising:
 2 introducing at least a distal end of an
 3 electrosurgical probe through an opening in the patient's
 4 chest cavity; and
 5 positioning the distal end of the probe in close
 6 proximity to the epicardium.

1 5. The method of claim 4 wherein the probe is
 2 introduced through an intercostal penetration in the patient.

1 6. The method of claim 1 wherein the voltage is
 2 applied continuously between the active and return electrodes.

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1 7. The method of claim 1 wherein the voltage is
2 applied in pulses to correspond to beating of the patient's
3 heart.

1 8. The method of claim 1 wherein the active
2 electrode comprises an electrode array including a plurality
3 of isolated electrode terminals.

1 9. The method of claim 1 wherein the active
2 electrode comprises a single electrode protruding from a
3 distal end of an electrosurgical probe.

1 10. The method of claim 8 further including
2 independently controlling current flow from at least two of
3 the electrode terminals based on impedance between the
4 electrode terminal and the return electrode.

1 11. The method of claim 1 further comprising
2 forming a revascularizing channel with a lateral dimension of
3 about 1.5 to 3.0 mm.

1 12. The method of claim 1 further comprising
2 positioning a radially expandable luminal prosthesis in the
3 revascularizing channel to maintain patency of the channel.

1 13. The method of claim 1 wherein the channel
2 formed by the active electrode surface is curved.

1 14. The method of claim 13 wherein the channel
2 formed by the active electrode surface has first and second
3 openings on one side of the heart wall, and a substantially U-
4 shape therebetween.

1 15. The method of claim 8 wherein the electrode
2 terminals are embedded in an insulating matrix to electrically
3 isolate each terminal, the insulating matrix comprising an
4 inorganic material.

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1 25. A method of transmyocardial revascularization
2 of the heart of a patient comprising:

3 positioning a distal end of a probe in close
4 proximity to a target site on a wall of the patient's heart;
5 and

6 applying energy to the heart wall to ablate tissue
7 at the heart wall while axially translating the distal end of
8 the probe through at least a portion of the heart wall to form
9 revascularizing channel through the heart wall.

1 26. The method of claim 25 wherein the probe is
2 axially translated through at least a portion of the heart
3 wall at a substantially constant rate.

27. The method of claim 25 further comprising means
for automatically translating the probe through a substantial
portion of the heart wall.

28. An electrosurgical device for transmyocardial
revascularization of a patient's heart tissue, the device
comprising:

an instrument shaft having a proximal and distal end
portions, the distal end portion being sized for delivery
through a small revascularizing channel in the patient's
heart;

one or more active electrodes disposed on the distal
end portion;

a return electrode disposed on the shaft close to
the active electrodes; and

a connector disposed near the proximal end portion
of the shaft for electrically coupling the active and return
electrodes to a high frequency voltage source to ablate tissue
at the heart wall and to form a revascularizing channel
through at least a portion of the heart wall.

29. The device of claim 28 wherein the shaft is a
catheter shaft configured for endoluminal delivery into the
patient's ventricular cavity.

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1 38. The device of claim 28 wherein the distal end
2 of the shaft has a conical surface, the electrode terminals
3 extending axially from the conical surface.

1 39. The device of claim 28 further comprising a
2 guide catheter having a flexible steerable shaft for
3 delivering the instrument shaft through a percutaneous
4 penetration into the ventricular cavity.

1 40. The device of claim 28 further comprising a
2 plurality of impedance monitors coupled to the electrode
3 terminals for determining impedance between each individual
4 electrode terminal and the return electrode.

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